Nemo day 1 session 1
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Paul: ... I will be leading this procession with Nicola Lambert from ECCC. Our overall host, and I'm going to say our workshop planner. I was about to say the box on my left, but of course boxes are a different place where people is Inge. Inge, if you want to introduce yourself.

Inge: Hi, everybody. I'm Inge Deschepper, I'm a postdoc with Paul Myers. And, I've coordinated and uh, hopefully brought enough people together for this workshop. Oh and I do biogeochemical modelling for the ocean and sea ice. I hope you all enjoy. I think Paul will start, um, uh, but, uh, there are some house rules that I'll talk about as soon as Paul shares the screen.

Paul: Yeah. As soon as I get to that slide. Okay. So 1st off, I'm gonna share my screen. I think that works. Nemo workshop slideshow. I'm assuming people can see it now?

Inge: Yes.

Paul: So, this is the Canadian emotion modelling and forum, community of practice, we're funded by MEOPAR, so with their logo there, and with the nice, sort of, ocean modelling forum, there was, uh, logo that we had developed, uh, this year, to really, to, this oceans, ice, biodjo chemistry, if you could sort of see the blue for dark blue, for whit, the waves, the ocean, the lighter blue, the ice, the, uh, fish for the biodju, chemical, ecosystems part. So I'm going to pass this over to Inga, briefly, just to help control and run it.

Inge: Okay, great. So, um, just some house rules. We would like everybody to participate, but to have a little bit of order, if you can please raise your hand, if you would like to speak. It should be at the bottom.You should have a button that says react and within the reaction, you should see the hand where you can raise your hand. And then, um, if I ask if you have any suggestions for papers or links and things like that, please put it, um, in the meeting note, the gender link. I'll add the agenda link, um, the meeting note link into the chat in a moment. And then also please be respectful of everybody. It is a discussion. We're trying to, um, uh, move things forward and everything, and then if possible, and if your internet connection works, uh, please uh, keep your camera on so that we can, uh, feel like there's a little bit of a discussion amongst the community and not just black boxes with names on it.

Paul: Great. Uh, that's me. Good luck Paul and Nicola. Yeah, and actually on that point, I'm briefly also gonna add, at one point, we're gonna stop and ask everyone to turn on their cameras, and we're gonna take the good old workshop photo of people with their boxes on cameras, but we'll do that. Actually, let's try to do that now. I'm gonna stop sharing. Let's see if we can take a photo now, then we can do one at the end of the session, Inga. Okay. That works. Okay, look, could you turn on their cameras for one minute, please? You may have to go through a couple of pages in here. You can take a screenshot.

Inge: Sure. I'm just waiting for people to, too. Okay. Sure, I'm just waiting for people to put cameras on, and then I will start doing screen, screen grabs hold. At least my first page.

Paul: Everyone has their camera on.

Inge: Yes. Okay, one, two, three, smile.

Paul: Nemo.

Inge: All right, next, page. Um, one, two, three, smile. Great. I think those are the two pages that I have.

Paul: Great. Okay, now, let's go back to sides. Thank you. Thanks, everyone. Um, so, yeah, so that one of the house rooms.

So, this is day one. We've got a couple of sessions. First off, Nicolas and I are gonna try to lead a short section with, hopefully, lots of discussion on ocean modelling development, globally, and in Canada, both on things we need to work on, things we can share.And also, this will also include discussion of tools and products associated with the model, et cetera.

Both Nicolas and I prepared some slides. They're going to hopefully guide it. But we're very open to watching this adjust to people of questions in the discussion move in different directions.

So, first, is there a minor, I'm going to give, uh, sort of a minor background on the NEMO modelling forum, some general points on ocean model, and ocean model configuration, Canada, the DRAKKAR working plan, and leading into topics for discussion.

And we're going to mention as part of this, we've proposed, when we put this in, we'd eventually write by 2028, a white paper, on ocean modelling in Canada. So how do we do this? How do we start building it is, I think, a question we should be starting to think about.

Um, this slide I used last year, but I think I want to repeat it because it's relevant. You know, many of us have been on these meetings for a number of years. There's a long, long-term collaboration between ocean modellers, government and

academia. We want to increase collaboration, sharing, and interaction. There's been events associated with the CMOS for many years. Youyu Lu, Susan Allen, for example, have set up sessions the day after those meetings in the past. We've also had many links through CONCEPTS, the Canadian operational network with coupled environmental prediction systems, and some of it follows on, and also many interactions from MEOPAR's prediction cores over the years.
And if you're not familiar, MEOPAR, the Marine Environmental Observation Prediction Response Network, it was originally a network centre, but funded as a network centre of excellence, it's now a federal government, strategic science fund, to support, uh, marine research in those areas. And a key part of MEOPAR is, they're quite, they call communities to practice, people working in given areas, and bring together practitioners, which can be developers, users, policymakers, et cetera. And in the ocean modelling space, we put/brought together originally, it was the Canadian Nemo users, but we've sort of, I need to reduce that Windows, but they start hiding some of the slides. But more broadly, all ocean modellers in Canada. I think there's many things we can collaborate.
So, our goals are, see what we're all up to, requests, share, code, output, data, increase interaction of highly quality personnel, early career researchers, potential employers, training, shared skills, all of that links with increased communication collaboration, which I think we all know.
Um, and so originally we had a short term, one year, preliminary of this kid in Nemo Ocean Modelling Forum, funded by MEOPAR, uh, that led to a workshop last summer at the SeaMoss, a hybrid workshop at the CMOS, uh, conference in Saskatoon. A number of us were there in person, a numbers would join online. I think it's some really good discussions.
Since then, we have submitted a longer proposal to MEOPAR.
We got it funded for 3 years now, started in October 2025, so it also supported travel for some HQP, Nemo related activities through to March 2028.
Um, so, that's going forward, some key activities were proposed by Monthly Seminar Series, which we have running. If you're not on the mailing list for that. Someone can add the mailing list details in the chat, because we've been running these seminars with two talks. Every month since last year. We'll have a lot more in June, then we'll have a gap, going to September, they're going to be starting again. We've got speakers through June, but then we'll be looking for speakers to get in the fall.
We have a website, you can click it, you can look at it to learn about different groups, activities, tools, et cetera. Also, if you're interested in the seminars, you can email Tahya, a PhD student who's coordinating it at present.
We have this website, with various institutions, this where you can request, share codata, documentation, forcing. It needs still improvement. It needs more things added to it. But again, we're working to build towards that communication.

Then, these are some slides that got originally from Youyu. But I'm thinking about just ocean modelling in Canada. Globally and in Canada, to, again, help guide us

towards our discussion today and at future meetings.
Numerical ocean models includes components of circulation, sea ice waves, sediments, biogeochemical cycling, um, you know, atmosphere, when we got a couple models. And there's many systems or code that exists. They have a lot in common, but also differences, and especially we'll get to when we get to our discussion.
Nicola gave a really good suggestion of how we're going to break up our discussion today, and I'll have a slide on that, in terms of scale, spatial interporeal, so from global to regional to local. Are people doing kindcasts, forecasts, climate type simulations, and that leads to a number of differences when we need to think about when we're putting together systems. And, of course, some models may perform better over others for certain purposes. So again, we need a diversity of models, and even within our model, diversity of setups, configurations, et cetera. Um, and I'll talk internationally, of course, there are indeed groups for Ocean Models. I've got some slides from the NEMO modelling consortium, and there are 2026 updates. I'll present it in a couple of minutes. But, you know, generally, these are open source models for global and regional applications, but there's still a lot of work we've done to develop, share expertise, bring groups together, and especially MEOPAR, CONCEPTS, the NEMO Forum. I think all plays a role in this coordination and this integration.

For Ocean circulation models in Canada, they're most structured and unstructured, Nemo, and a lot of us are focussing on it, but there are others. There's ROMs, Regional Ocean Modelling System, the older MOMS, croco, uh, these are, I guess, the structured models, many of the most sort of subcomponents with ice, waves, sediments, turbidity, as well as embedded Lagrangian models for everything from icebergs, to virtual floats, people studying oil spills, microplastic roots, et cetera, that are linked to the underlying structured models.

Unstructured models, FVCOMS, schism, Mike. FESOM, although I don't think anyone's running the German FESOM in Canada. But again, they're also valuable for integration, comparison, et cetera. And of course, there are many applications, short-term forecasting, a coupled climate modelling, waves, long-term hind casting, future ocean modelling, run at many centres, universities looking at different aspects.

And then people are, of course, using different process studies that are looking at water formation, agriculture, ecosystems, sediments, tides, lakes. You know, again, we've got a huge application. So again, there's okay, the need to bring the groups doing those, sharing the coolest code results together.

Going into Nemo, which a lot of issues, but again, not just, as you saw those lives, Nemo's got a website here. With a lot of good aspects. Interestingly, we've

recently upgraded their Nemo version to five. Many of the groups, I think, on this call, were still using an earlier versions.

We're exploring NEMO 5. Got a lot of advantages. It is faster. There's some of the time stepping changes, there's things done that will hopefully integrate, um, agriff better with tides and other activities. But there's also a lot of, and also there's a new sea ice model inside cubed, which I know there's discussion. Why does the models say, say, some of the forecasting is, right now, the CICE, will there be a switched SI cubed? Can we learn from that in this latest version? But there's also a lot of questions that getting good configurations.

This is not a session for necessarily science talks, so maybe people ..., but getting version 5 to get similar fields as version 36. I know for our group has turned out to be really challenging, there's a lot going on. So, again, things that we might want to talk about.

Nemo governance, Nemo has a steering committee, scientific advisory committee, working groups, consortium experts, developer team, system team. I'm not going to read the slides, but you can find on their website if you're more interested.

More relevant is if you want to ask questions, here list the system team members at the 5 major institutes. These are people beyond, just through the original managers, Catherine and Sebastian, you can contact, or who may be responding to you, if you put the tickets in on the online systems, and the developers, co-chair committee, or Pier Mathio, and Dorothea Novano. So again, for discussing big picture topics, for their work plans, there's a number of working groups.

I'm gonna move the little window again.

So, right now, there's working groups in Nemo and AGRIF, Air-sea interactions, data similation, Eddy closure, high performance commuting, the kernel, lad, ice ocean interactions, machine learning, and model uncertenties, sea ice, tides, the tracer paradigm, verification, validation, diagnostics, and the engagements, lots of things, relevant going on, that I think are, that Canadians can be involved in planning, et cetera.

And some of these will talk about today. Nicolas is definitely going to talk about aspects of the diagnostics and shared tools for that later in this discussion.

One little thing. Um, when I look at these icons sort of have these ones, this is supposed to represent the sea ice, it looks more like an iceberg to me, um, but anyways, that's just, that's a minor point. So there are 106 actions, they're working on, I'm not gonna be able to all the details. There's a lot of work on going in terms of new functionality, improved HP performance, uh, things, Juliana, I'm gonna be

very happy to hear, and I know others, just work on icebergs, improving thickness, some grounding, interacting with the sea ice. I think that's incorrect, some of the stuff Julianna has developed.

Sea ice, they're working on flow size distribution, brittle rheology, and new advection scheme. Eddie closure, plus biharmonic GM, improve meant for geometric, sarcastic physics, are being explored, tide internal drag, or, again, on the working list, mixing updates for the Eddie Mass, flux convection, so a number of different schemes are being looked at.

They're working performance. How do we couple different aspects? SI3, iceberg, surface boundary conditions, PISCES, et cetera. They're trying to explore. Can we use GPUs for efficiency? I don't have a lot of details on that, but it'd be interesting if they could get it to work, although potentially getting access to GPUs could be a challenge. They're exploring different precision versions of Nemo for performance, tiling capacity. All of these things are outgoing, AGRIF, they're what improved AGRIF compatibility with all the Nemo components, which I would think would be very useful.

We're working with machine learning.

They're working on the interface to couple the emo to any biogeochemical model, which would be really exciting, if when developed, playing with coordinates, such as pressure coordinates, and that's there's a lot of things going on, from the development team. I know I've gone over this very quickly, but I didn't want to spend too long on this.

I will answer questions if there are. But otherwise, I really want to get into topics for discussion.

I'm doing the 1st half. Uh, I've got, uh, sort of, again the aspects of development, the Nicolas gonna come in there at about 11, give a few, again, background slides, and leave the second part of the discussion, and then we'll try to integrate it, uh, to the end.

And the suggestion I like is, you know, topics, how do we think about the spatial and time scales we use from ocean modelling. And by spatial scales, I've got them into the global, regional, coastal limited, and very high resolution, which could be coastal limited, but it couldn't even be regional and global nowadays, and it's got a different set of problems.

For time scales, I'm not thinking hour, daily, monthly, but for the types of models we run.

Hindcast, forecast and projections, 'cause they use very different forcing, they look at different aspects. And so there's some similarities, but there are things we're looking at those problems people have to work on differently.

And as they lead into the discussion, as they said, I want to switch to that in a second.

I prepared, uh, 2 tables here. The spatial is the top one. There's four, three, four different, and if everyone is scales, global, regional, coastal limited, very high resolution, or blue. And I put at least three things that are relevant for each topic, but there's going to be more for discussion, and that are temporal scales, hindcast, forecast, projects. I put two different prod processes here.

So I think what I'd like to do is start, um, going through this by scale, starting, I'm going to do the spatial first, and, you know, seeing people, uh, comments, suggestions, things they've learned. I think I've set it up, although I've got these points for leading if we get quiet at one point. And then, probably in about 25 minutes, we'll switch to the temporal scales for the rest of this hour for that discussion.

Um... So, one of the things I've got in here, we think of spatial skills, we go from globa,l regional, that is forcing products, and global forcing developers. This may sound simple, but, for example, um, river runoff. You know, we were, we were using a hydrological model to provide some river rock, but somebody for the Arctic. Then there's the, say, products for the Greenland ice sheet. What products are used for Antarctica? That's different global versus regional.

Also, this question, especially for higher resolution modes, what higher resolution atmospheric fields, like this CARRA, CARRA2, the arctic, you know, is being developed, but they are, you know, are on limited domains. So how does that link to driving aspects of ocean models?

Let's ask for, again, hands up and feedback and comments from others.

I'd really like to pass some of this discussion on.

Does anyone agree?

We need a broad suite of global forcing products, uh, different spatial resolutions, uh, different temporal resolutions, and especially for the higher resolution, cover the relevant domains.

Greg.: Well, uh, and everybody, um, yeah, thanks for that great introduction. I

mean, it's good to you to think beyond just Nemo. I don't know sort of how many non Nemo people there are here, but, um...
I mean, I think if we see ourselves, you know, as Canadian ocean modellers in the context of the other groups, so the rest of the folks who are using our respective models and whatnot, and what we can do together, I mean, they're the regions that we're looking at, so it gets a little bit more into the regional, about the east, west coast, the north coast, and the global.
I mean, I think certainly one of the things that could be helpful is to, you know, think of ways that we could be facilitating, you know, the sharing of knowledge, tools, and data sets associated with these different things.
So, that, sort of, speaks direct. Your point about the global forcing products. I mean, sure, we can all go and download era 5 or whatever is the flavour for the month, but, you know, I think there's a lot of kind of knowledge and, you know, little details about how to tweak things to make it work correctly that goes with that.
So, I mean, there have been discussions in the past about having, I think, having, I guess, maybe more of an Nemo thing, but, like, a Canadian Nemo Slack page. I don't know whether that ever really took off, but, um, I wonder, you know, it's been a number of years since, you know, we had that discussion, at least five, I think. And so having...

Paul: Sorry. Yes, it's going to be discussed, hopefully, on Wednesday.

Greg: Okay. Um, so I think certainly being able to have some sort of tool that we can be sharing, um, sharing knowledge and actual tools, I think, is useful.

Paul: Agreed, you know, making the files available, how to do that, what is it, the tools, what impact they have for sort of making your choices. Yeah, I think there's a lot of things there.
Uh, I've got, I've got one thing I'd love to, I'm going to say, bring up on this, but I think I'll wait, because I see another hand, Amber.

Amber: Hey, yeah, thanks, Paul. Thanks for the great introduction.
I'll just kind of amplify what Greg is saying, that, you know, I totally agree that, you know, we need better data products, particularly for the rivers, and it might be useful to start something like a GitHub organisation, uh, under the Nemo modelling group. And then, you know, you could put in the read me. You could put links to all of these forcing files.
But then, you know, it strikes me, like, Michael Dunphy's group is working on, I think it's Raven downscale. Um, because the products they need aren't available. And then you have, you know, then Natasha Ridenour, working on Cantods, Rivers, and they're using different methods, and it would be great if we had a central location where you could put them in, you could, you'd go, okay, I need to do this.So what are people already doing, and can I build from that?

Paul: Agreed, then? I'm gonna say, we don't need a central location for storing it, but we're just able to look where someone has a link to where things are. Otherwise, one person has to... But yeah, no, I totally agree. And it's not just, yeah, it's different, all their river, ice, whatever products I've got, jumping on a hat. There's also, if you're using climate models, what about routing schemes? Because if they're not going to go into the ocean at your resolution, how are you going to get it to those correct points?We know that's a major challenge that's attached to been pulling under her hair over that for the last n months.

Amber: Yeah.

Andrew: So, it took me a while to find my mute button there. Yeah, I mean, in terms of of, of, well, analyzing the model too.
I think we, we need to, to, uh, really harness the, the, the, the inner comparison groups that are out there. So, I mean, there's a whole bunch of reanalysis in their comparisons. There's, of course, all, um, climate inter comparison.So, so we really need to have kind of, well, they have these analysis tools that we can possibly harvest or what have you.
So, I mean, just being able to use, what is this out there for global models?I mean, I think it probably applies for the regional models as well.There's a lot of kind of community tools that can be used, and we need to make our life easier if we can.

Paul: Agreed 100%. And I'm also gonna add. Especially because for analyzing big models, like one of the points they have, you're running a global model. Your own group may not be an expert on everywhere. You need to take advantage of people who have knowledge and expertise in those areas, maybe explored it, and share and take advantage of what they've learned.

Sorry, Nicolas.

Nicolas: Yeah, no, that's great. I want to, yeah, just come back to this special skill, and just saying that, uh, yeah, this can be some expenses that goes to regional, or global, and et cetera, but often, that's the crossing the scale, that it's a little bit more difficult. And, uh, that's crucial. For example, for some regional models who have information from the global model, to have their boundary conditions. So, um, yeah, just think that sets me a work that we're doing, uh, uh, uh, environment Canada, to cross the boundary between global and uh, regional, uh, but yeah, that's, that, that's a challenge, because, um, often you're not the team in quali, uh, managing the quality of the, the scale that you're not in charge of, so to have good communication stream, and to, uh, have good 2 that cross the boundary, it's crucial, yeah.
I'm just saying that I'm very proud of the work from Natasha, doing great with the river routting. That's a wonderful tool, but I would let her explain it if she wants to.

Yeah.

Paul: Yeah. No, I agree, 100%. There's a lot of things in there. They're gonna come into play.
One thing also, you know, Greg made the comment, you know, you know, you can quote, pull ERA 5 off the shelf.
You can maybe pull whatever the JRA one off the shelf. But you can't really just use them off the shelf without potential errors. ERA's got these occasional, it's got, from its warm bias to these occasional, you know, massive, uh, wind spikes that appear in the Arctic. I know, uh, darkened down, it's going to do that, at NCAR been working on it, trying to put a corrected version of that. There's things that mean biases in all these products that may need to be looked at.
So, again, there's questions, can you just use it off the shelf, or do you actually need a slightly modified, where people have at least looked at these and potentially tuned or filtered some of these events out?

The other thing, I don't know an answer, and you may know more than me, Greg, is when we're forcing with these products, Nemo actually has five or six bulk formulas for the atmospheric forcing. But most people, at least us, and I think most of the groups, and maybe I'm wrong with, uh, maybe this is some of the groups with ECCC or DFO, aren't just using the good old NCar, Large and Agar bulk formula.Is it the fastest as we switch to, um, you know, ERA, JRA, And if maybe we imply some of the and cara or whatever else. And it may also be different in coupled models.
Um, has anyone explored that question?

Greg: Yeah, yeah, we've looked at it. I mean, I think your question is, I mean, is it best for whom, right? I mean, so...
Okay, yes. You know we run coupling?
I mean, often, so ear 5 has seen some bolt formula and some surface conditions, and so their fields will be consistent with those. And so as you run with something else, then you're extracting more heat and momentum and whatever, than the atmosphere matches. So then you're not being conservative.
So we've done some examples where we use different schemes offline, in our coupled model, and look at what the impact is and differences. Because we make some match things a little bit.
So often, in the ocean models, in the analysis systems, we'll use the core, uh, CORE, and, um, but then Jen uses its own RPN bulk physics, uh, and so then we looked at how all those compared, and also comparing to the COARE. I mean, I think there's, there's a certain consensus in the community, at least, that, like, the COARE is the most sort of up-to-date, complete system, but it doesn't necessarily mean that it's gonna give you the best results.

Paul: Great. Thanks, Greg. Neil?

Niel: Uh, yeah, well, two comments, but on that particular point, Jonathan is, it has done a fair amount of work, also looking at that, and trying to put in, for example, both pulling up from out, um, atmospheric physics package into Nemo.
And so one thing that we've done on the kind of CanTODS exploration is trying to really understand the question, um, If we can, we've got a downscale. So I mean, going from a global model to a regional model.
And with, you know, If we just kind of went from one degree, CanESM down to 12th of a degree, CanTODS, and we just put in all this different stuff. Okay, now we're forced, now we're using the core bulk formula and now we're doing this correction and this bias correction and all of that kind of stuff. If we just put in all these changes, we get a very different result. In that regional model, but we wouldn't understand why the result was different from the global model.

So one thing that we're trying to do really carefully is to say, can we decompose all, well, like 1st identify where differences are coming from and then kind of decompose them. So, you know, one way of doing this, is to basically run a global model at quarter degree, and then run a regional nest at quarter of a degree, or basically, you know, CanTODS a quarter degree. And then, so, you know, there's not a difference, specific resolution, and all the differences would only be become entering because of, you know, how we're applying the system. For example, in an ocean only configuration as opposed to in a couple of iteration and applying boundary conditions, and we can decompose all of those effects, like we've got a whole big series of experiments.
So yeah, and anyway, through this exercise, we do see that what you choose to apply at the surface makes a very big difference in the result that you'll get in the interior of the domain.
Yeah, I think that's an important topic.

Paul: Um, I agree.
And that also, that gets on to, like you said, Jonathan's been testing and Greg, made comments about some of the testing that's been done. Again, this gets to, does everyone in the, does everyone in the community know about that?
And can we all potentially take advantage?
Again, this is where, how do we, I share information, because I think some of those tests will be of value to other groups across, people are involved in this call, other groups across the country. And so, you know, yes, we can put papers, but I bet a lot of this is not out in published literature. It's an internal report slash, just what people have tested. And sometimes, almost that preliminary stuff is as much a value, um, you know, similar to stuff we've been playing with, with now, uh, parameters and stuff with SI cubed and Nemo 5. It's not the stuff that likely will get in a paper, but it definitely tells us a lot. It doesn't tell anyone working with it. Um, so again, as Amber was saying, you know, we need to have places where we could have links to, even if it's just a couple of figures that people have done and

showed, Wait a second, there's major sensivity to whatever.

Neil?

Niel: Uh, okay, yes, uh, I was thinking, I'm not sure if this is the right place to say this, uh, the right time to say this.
Um, be honest, we're talking about this kind of communication and how we do things, and how we do things across scales and all this kind of stuff.
Um, I think in the history of CCCma, kind of the approach that's been taken is to, as far as possible, try and take a single model, and apply it, um, as it's in the sense that it's appropriate across these different scales.
So just one example of that is using exactly the same model configuration, or seasonal predictions that are, you know, ready for subseasonal predictions, even though it just died for one month, versus the same model that's used for climate projections, that might be a 1000-year-long.
And that has allowed a lot of effort to be placed into getting the correct consideration of that model, analyzing that model, really deeply, having that model understood very thoroughly, and then used as a common basis for a broad range of applications.
Um, that's where we kind of think that we have a big efficiency in that we've been able to do certain things quite well. Now in this context, I'm just recognizing that the Canadian Nemo community is quite small.
But if you actually look at the big list of all the model configurations and stuff that we have, it's quite extensive. And, yes, everyone's trying to do slightly different things, and in some ways, doing things slightly differently is good, like diversity is good, because you discover different things.
But at the same time, there's a question of, like, how efficient is that for a very small community to have multiple, of these regional domains that are similar, but slightly different, you know, global demands that are similar, but slightly different, oh, just forced with slightly different reanalysis force, and I do think that there's maybe a worthwhile question to be asked. About whether we could be more effective if we could agree on a smaller subset of kind of model domains and configurations.
But then people could kind of tweak and customize their particular applications.
Um, it's just a thought, but I do recognize that we have a lot of, um, activity in a small community, and I think it, maybe those are efficiency.
I'm curious what other people think about that.

Paul: That's a great question. I'm not gonna answer right away. I don't want to bias it. I've got my own thoughts on that.
Anyone else want to throw any thoughts on Neil's question?

Amber.

Amber: Yeah, I was just thinking, you know, like, the, there's the model domains and configurations, which we have a lot, but it's the, it's really the code base that gets, that makes it more challenging, 'cause that's the part that takes a lot of development, right? And so, number of years ago, at DFO, Nicolas put together our Nemo 36MC, which we then started using across DFO, and all modifying the same code base on different branches, and it made it easier for us to do. But I think the big thing here is, you know, you've got your, it's not gonna be DFO that's gonna lead the way on this, right? It's gonna be ECCC.
And so you have, you know, the short term predictions, kind of people using maybe a different code base than the long term projections people. And so I guess my question is, how do we reconcile those quite different applications into one code base and what would it look like?

Paul: Great. Thanks, Amber. Greg. You're muted.

Greg: Sorry. Um, I see sort of three or four pieces, maybe, to it. So is what Amber mentioned about the code.
Um, so I think, already, that one, I think, is maybe getting easier. I mean, maybe not so much with respect to the biogeochemical part, but with the, like, the physical ocean modelling.I know us internally, here, it had, let's see, and see, that we have fewer and fewer overrides over the basic code. So that's getting easier, and we're also looking to migrate towards SI3.
So I think that would also allow for greater homogeneity across the country. I think that would be very helpful, in fact. So there's sort of the code piece that I think is maybe more manageable.
Then there's sort of the configuration part. So, I know there's sort of various flavours of what we call C Ridge 12. So the kind of Canada three oceans. So some people wanted a little bit more in the Atlantic or a little bit more in the Pacific or whatever.
So, I don't know, maybe there's something there to what Neil said about, you know, we came up with it at the beginning and did what we thought made sense. And I think if we were I to do it again. I would do it differently.
So this may be something there, especially as we're looking at it. You know, we've got a real time system.
There's, you know, biodger chemical applications of it, there's, like, climate down scaling applications with CanTODs, and so having the same configuration definitely would have benefits, so I think there's maybe something there.

And then I think another piece of it is the, like, the namelists, you know, with everybody's using different versions of Nemo, it's not as easy. But I think everyone's kind of at least trying to get at least to nemo 4, and having some sharing of, you know, what parameters we're using for things, um, could be helpful as well. You know, I'd imagine some, you know, master students starting some

projects. And if they were already able to look and have access to the nameless from some Canada Nemo page, I think that would be very helpful. And then, of course, there's of course things.

Paul: Yeah. Thank you, Stephanne.

Stephanne: No, yes, um, I just... I think this, for the code base, it's certainly important to be using a consistent code base. Um, that makes it a little trickier if people are trying to move towards Nemo 5. Um, if some people are moving towards Nemo 05. Some people are kind of sticking with 4 'cause it's more stable, which is perhaps more appropriate for operational use. Um, but certainly consolidating that, I think, is important, but also a very, very large task. Um, and I don't know that, you know, everybody's stretched pretty thin.
But certainly sharing namelists and having a central location for doing that, I think, is both worthwhile and extremely helpful and relatively straightforward to do. They're just text files, right? So, uh, I think that's the sort of thing that's kind of low hanging fruit, but consolidated code bases is great, but it's a lot of work.

Paul: Great, thank you. Nicolas.

Nicolas: Yeah, uh, I will disagree a little bit with Stephanne, just saying that, uh, for me, having the same cold base could be the easiest thing we can do. It could be just a question of doing a git merge, and then it starts. Of course, it's not that easy. But just saying that right now, all with the version, controlling pool, and all the managing that are in front of us available. I think it's a test that we could take, and it might require some modification with some of the development that people have done.
For example, if you develop parametization, you should be able to put it off, if you don't want it, or something like that.
So, yeah, I just want to push a little bit, that, um, that's something that we're constantly doing at CCCMa to have a common cold base with all the different experiments, which is, like, neither was saying, with all the different time and spatial scale, they are available with the same cold base.
So I think it would be a good exercise, and a good communal work as well, that would improve all the communication with all the work that people have been doing. If I see someone develop this option with the water level, at the boundaries, for example, then, oh, I know they're working on that, or if a new ball formula has been added to the call.I know this one dog is working on that. So I think it's, uh, it's, uh, like there's not, like, uh, they, they say it in English, it's, uh, un Pierre de coup, it's one stone, and you have to, uh, to hit the, it's in French.
But yeah, I think it would be good as a size to do and have a shared place, GitHub, gitlab.com, something like that.
It would be a good opportunity.

Stephanne: Yeah, I should perhaps clarify what I was saying. Um, certainly, like, using version control, and that makes it much more straightforward. Absolutely. That's not what I was suggesting. But if we've got some people who are using, Uh, SIQ. Some people moving off of lim 2 and 3. Um, so people use the CICE and trying to manage all the kind of flavours of interactions, that, that gets complicated quickly. And, um, sometimes, like, the DPNM group is using the CONCEPTS code base, but the concept of it is tied to this, but then if we want to consider, um...
Like, it's, it's, it's not so much the, the kind of, little level of gift work that's difficult. It's the coordinating the larger scale, like, how does this work with all the stuff that we've built before? How do we put into the effort to, you know, make the migration from one, you know, somebody's going to be migrating something. How do we manage that migration from what we're currently using to a consolidated? System, and how do we find that consolidated system that works for the most amount of people?
That's the work. The actual kid stuff?

Nicolas: Absolutely, yes. Yeah, I was probably gets you a little bit on purpose, so...

Paul: Great, thanks, Stephanne. Uh, Greg?

Greg: Yeah, so, I mean, we were having a discussion recently about how to manage our code on Git, as we're migrating now to Nemo 42, and you were talking to folks at Mercator about what they're doing. Um, 'cause there's some bits of code that we, for the assimilation we needed from Mercator, and, um, and it seems now they have their own fork of the code on the Nemo git.
And so I wonder, I mean, I think we still need to have our own local git repo, but, um, I think it would be fairly straightforward to have a, you know, a version of it on, on, like, an Nemo fork.
Is that a way? I could see how the Nemo consortium folks would probably like that. Given that we're sort of a big group of non consortium Nemo users in Canada that if, you know, I don't know if we don't have them, if we couldn't make a fork, I'm sure they could give permission to do something like that.
And then we could have, like, a consolidated, you know, and even if, like, Stephanne says, there's a 36, and a 42, and a 5 0, but you can see the different things there. And then, as, you know, we're trying to move to five, then we can grab some lapulse stuff, if somebody wants to use something from our configuration, they can pull it from there, then, you know, conserting people. I don't know.
So maybe there's something there in terms of, uh, doing it on the Nemo, uh, central repo.
Okay.

Andrew: Can I just add something to that, Greg?
I mean, I think if we ever want to be part of the Nemo consortium, that's gonna be a requirement that, I mean, there's no merge without having your code on the Nemo repository, so, I mean, that's not really even a nicety, it's almost a necessity.

Paul: Great, thank you. Um... Amber.

Amber: Hey, yeah, I'm just swinging back to the talk about, uh, unifying domains. Um, I mean, I think, you know, when I was talking about ECCC, kind of coming together on the C reg domain, kind of, that seems possible and doable, and they're both using 4.2, I think, because it's more stable. But then when we think about trying to align with some of the university groups in your group, Paul, you guys are ahead in using a newer version of the model.
But not only that, I think it could be really difficult to reconcile your domain in ANHA, which extends really far south in the Atlantic, with the domains that we want to use for projections and shorter term predictions that have to extend the other way into the Pacific a little bit more. And so, I don't know, I'm wondering if that's even really possible. To try to unify that.

Paul: Oh, Stephanne, can I...? I think we're kind of, but I would like to answer, Amber, please, you know, I think I've got some points on, you know, I agree. There's some interesting questions, you know, there in terms of, I think, you know, working now more with ECCC, with the Cantods stuff.
Having similar domains, you know, there's places where separate, you know, are dispelled for different problems, but are, uh, especially also computers you get more powerful, and at the course of resolution, slightly larger domains, can be fit, because, you know, we are now doing our ANHA4X, which now includes North Pacific consistent with a number of domains that ECCC is running. So I think there is place for getting domains close, so we can do more, this comparison.
But I think even more, it's the Forcing. It's the namelists. It's those other things that we could have similar experiments to look at responses. The other thing, I think, is also Nemo allows with AGRIF.
Eventually, I'm thinking, you know, we're thinking of now taking our, say, our 1/12 degree on a domain, and you're doing this in agra nap, the global orca. And at one point, then, you get rid of some of the open boundary and a whole bunch of other issues, there'll be some technical things. I think that would be one way we'll be getting moving towards some similarities in domains.
I also think it's important, those similar experiments, like, we're running now, we haven't really talked to this discussion, now up to 1/60th degree. We want less than one kilometre. We run twin, quarter into 1/12, to try to understand that role of resolutions with as little change as possible, because I agree. The more you change, the harder it is to try to figure out and find and pull these things out. So I think there's a lot of places where we can't, Yeah, we can converge more than we

have, and we'll get lots of gain from that.
So agreeing with what a number of people have said.
Stephanne?

Stephanne: Yeah, I just wanted to note that I'm not sure if we need to be...member, an official member of the NEMO consortiuum, to be able to have, uh, space on the official Git Lab? I don't know whether that's a chicken and egg thing.
Um, but I think all of this certainly feels into the need to be in a part of the consortium, so...

Paul: Great, thank you.
Also, a couple several people have, we've talked about versions, a Nemo version, obviously, there's a lot of work changing on for systems. A lot of people have made the comment about 4 being more stable.
I'm not sure I agree with that.
I 4 was an absolute pain in the neck disasters get running, I thought. We spent months and we still had issues, and we never realized it. Five. To me, seems more stable. It's not perfect. And there's questions about, okay, good results.
But I like 5 way, way better than 4, and it's much easier to get working, um, at least to our thoughts, you know, that's, that's getting into another discussion. Um, but, yeah, um, I think version, but having a similar version would be useful, especially with that big difference in the ice module or the ice model.
Michael, I think you laid your hand up for a minute.

Michael: Um, yeah, I was just gonna comment back about food consolidation, um, if this is going to happen, there's going to need somebody to lead it. It doesn't happen organically, right? So, um, that's, I think, where the challenge is going to be.
Who has the capacity to take this on if it takes, you know, a 30-year time? Or something like that.
Um, and then, if we do have the spirit capacity, maybe it makes more sense to, um, think about this, uh, thing about using the capacity to consortium, uh, contribution instead, there's this requirement of some, uh, engineer time to join.
And then the other code, then the other, um, comment is, uh, under the assumption, as too costly to do the code consolidation, a lesser goal could be just have everyone, um, mirror their code base to a common place. Um, you know, maybe there's five or ten code bases there.
That could be, like, a partial one.

Paul: No, I think that's true. And maybe that's one that, you know, we've got this Nemo community of practice. MEOPAR is a small amount of money for running the seminars, people coordination, sending students to things.
But maybe we should be exploring, trying to get more significant money for such activities. I know MEOPAR provides significance, money to see use, they provide a

lot of money to people doing observational work. Maybe we need to be getting more trying to get, you know, money for a real person to do tools and code consolidation and those aspects, and then, like, playing a role in the consortium membership.
Again, that's a separate topic for another place, but we could come back to that in the last day.
Geoff.

Geoff: Yeah, okay, uh, several things, yeah, like, I think dreading the, the Nemo conservation would be, um, Exam funding and people time, but I think that what we get out of it would be a lot more than what we put into it. So I hope we can continue that discussion and eventually make it happen.
And, yeah, I just, what Michael was saying, I'll agree, it had the same thought that we should just try to have all of our code bases be public facing, so that that organic sharing can happen. Um, it's, like, the least effort way to get everyone, sort of, coming together, um, organically in a more, uh, you know, harmonizing different things where there's no one, like, imposing, okay, this is what we're gonna do.
This is the domain, these are the nameless, but, sort of, um, people can talk to each other, and figure out, um, that way, you know, in a more scientific way, like, what do we, um, prefer, we can sort of try to convince each other of what's the best way to do certain things.
Uh, and, like, even just on the topic of namelist that has been discussed of.. Post your namelist.
Well, the thing is that those aren't, uh, static things, those evolve in time. And, I guess, he's a CCCMA, we have these big discussions internally on our, like, at lab behind the firewall. Whenever we change any nameless parameter, there's a huge discussion. But if we're just posting that namelist, and it gets updated, well, someone will see that and think, Uh oh, okay.
Do I take the new one? Why? So, I think we just need to be able to have this community, and then, if there's a nameless update, you say, well, you know who to talk to, and you have a conversation.

Paul: So, I think this community is... So the old and the new name list, so people know what was used at different stages in different times.
Fred.

Fred: Okay, sorry, I came, um.. too late for the beginning of the meeting. So, I missed, uh, a lot of the discussions, but I, um...
So, I don't know if you mentioned that already, to visit diagnostic group, as part of, uh, the, uh, working group of the, the Nemo consortium, and, uh, anybody's is welcome to to come. Anyway, any any booking group in general, you're welcome to come whenever your affiliation.

Paul: We know Nicolas is gonna present some slides, and we're gonna have a whole discussion on diagnostics and that in the next hour.

Fred: Oh, okay, good.

Paul: Your perfect timing, because I totally agree, you know, there's something that that is, you know, really important.

Fred: Yeah, diagnostic is really where we tend to reinvent the wheel every time we have a new emission almost, so, yeah, yeah. Okay. Great. Now, we're almost at the end of the first hour, so I don't want to take into Nicholas time.

But there's one point I have in this table of topics, I did really want to bring up that I think is a major issue, at least among, if you want to say, the ocean hindcast, producing reanalysis community in that, is being able to have forcing products to properly allow us to run for recent years.
Observationists want, you know, when they do want to use models for evaluating things, generally, they've got observations, they've collected over the last few years, and they want to say, okay, I've just got this boring out of the water, this cruise.
Where's your 2025 model output? And many of our hindcast studies go up to 2019 or 2022 because we've run out of forcing files or our river runoff is is repeating because we don't have it or Greenland melts or that. And this is getting, you know, beyond just things we can easily do.
But I think this is a major question for, um, that I think we need to explore more is people, you know, in the hindcast frame, people want those hind casts to go from, back, say, the 50s or the 70s, and how do we get the products that are going to allow us to really run properly, um, those more recent years. Um, you know, you know, the forecasting groups, obviously, are getting data for their ingesting and that, but they're, I guess, using couples systems, like, what do, you know, and I'm not sure if they're doing any better.
Like, what do people do for river runoffs for the last two, 3 years or the Greenland Mound for the Antarctic discharge or things like that? What's being done at ECCC? Or, you know, DFO, you know, are you still in, you know, the same place that we use what we can and this, you know, issues as we go to the more recent years? Uh, Stephanne?

Stephanne: Uh, well, I certainly can't speak for anybody. Uh, else, but, um, for river runoff, I have some automatic scripts that grab gauge data. Um, and update NetCDF files that I use for that, uh, in combination with climatology, and, uh, the DB&M group has scripts that, uh, collect the operational output, and keep, keep ahold of that so that we can, you know, run in, in longer chunks, uh, in, to basically extend our hindcast as, as need be.

Paul: Is that global, or is that just for certain gauge rivers around Canada?

Stephanne: No, that's for I have three gauges that I keep track of...
56:11.00
I feel, like, it's not...

Paul: And again, this is obviously a spatial problem what you're looking at. But, yeah, there's certain areas where I agree. You probably can get that data quite well. Other areas, it's more of an issue.

Stephanne: Uh, yes or no.
I mean, it would be pretty straightforward, I think, to generalize my scripts to be able to pull, like, if you had major river gauges that before a larger region, then it's just calls to an API, right? Like, that can be scaled up pretty well, I think.
For Canada.

Paul: Yeah. For Canada, and if the data is available. In many cases, you know, the observational data takes three to five years to be processed and made available in some...

Stephanne: Oh goodness, I'm... Yeah.

Paul: Um, no, I'm thinking stuff that, like, that's what a level gauges, tide gauges, things like that, is automatable. Beyond that, yeah, you're.. It's a lottery.

Paul: Yeah. Greg?

Greg: Yeah, it depends a little bit where you're talking about. I mean, I know for us anyway, you know, we have some real time data for the St. Lawrence, there's certain gauge flows we can use, but I think the real challenges with the North. Um, I mean, we've sort of been waiting years for our hydrology group to deliver us a kind of a real time system, run over the past that we can use for getting fresh water into the Arctic in particular. Um, so I haven't heard from them in a little while. I could get an update, see where they're at now. Maybe Fred has more details on that, but, um, I would think that's really where there's some benefit, um, because it can get tricky and more than just have engaged flow.
I mean, you do need to get off the rooting right, the Mackenzie's complicated, um, but I think that, given the importance, the fresh water to the north, and the limited amount of data we have, I think it's something to prioritize.

Paul: Yeah, no exactly. And, you know, then there's Greenland Mel, Mount, the glaciers in Canada.
And I know nobody, I don't know how many times I've seen a reviewer say, How

could you even talk about present day freshwater process in the ocean when you're using climatological or the last year repeated?

Greg: Yeah, now I know what we do is not satisfactory, for sure.

Paul: Michael?

Michael: Yeah, so just on the runoff file, um, on the West Coast, we're, um, setting up these Raven models that integrate HRDLPS, to give, um, an hourly runoff, uh, 'cause they'll run off square important on the West Coast, as well, and not, not very many rivers are, are gauged. So this will give us 2019 ish to present. Once this is, once we're happy with it, which is getting close to the end.
Oh, um, we were able further in time, we would need some sort of a hind cast of HRD LPS, which we don't have.

Paul: Oh, Natasha. Rivers, your favourite topic.

Natasha: I know. We have a fun budding oceanographer here, as well.
Um, yeah, I guess one, uh, comment is, um, like, I guess with the future, CMIP, like, projections, those go up, of course, to 2100, and there's been obviously a lot of work with downscaling all the rivers and stuff like that.
Um, I don't know if that would be, uh, beneficial, at all to have you have, say, your historical downscale, rivers from like a CMIP, um, take any or other CMIP model that goes to 2015, and then have, uh, kind of, and then you have, say, some future discharge that goes up to the 2025 or something, if that would be, beneficial, um, because of course, though it's kind of, it goes in the projection, um, aspect, but it would go maybe a little bit closer to the years that some of the regional models might want.
So.

Paul: It's probably better than nothing, but there's always no the concern, you know, when those are simulators, a specific year is not messing the same, as the reason here, and if we're going to compare with a specific observation, Yeah, that's a good point.
I think of something...

Duo Yang: Yeah, I just want to have a comment on this, uh, nameless initial condition, and the forcing files for, uh, starting a new, uh, version or configuration. I think, uh, that seems, uh, not, uh, necessary to be perfect, but, uh, if, uh, if there is a set of this, uh, things, that would be very helpful for, for, for setting, because, uh, I was just thinking uh, about uh, the past experience from myself, like, when we start, like, in the most 3.4, or, or, NEMO 4, they, they have different domain, but, uh, the, the most like, difficulty is to have this set ready and then to get that stuff. So, in that, in that case, we could probably just have a some, very basic, uh, uh,

things set up. And then, uh, each group can refine that later.
Yeah, that's...

Paul: Great. Duo. No, I agree. I think sharing that will be very much of use.
We've sort of come through the sort of an hour, so the session. I don't want to eat into Nicola's time.
Are there any last comments or any things I've brought up? If not, we can always come back to them at the end, or we'll probably come back to some of these at the end of the meeting when we're talking again about coordination aspects.
If not, I am gonna pass, uh, the host roll over to Nicola.

Nicolas: Yeah, thank you, Paul.
Uh...

Paul: Do you want me to stop and do you want to share?

Nicolas: Yeah, yeah, you can keep sharing, but you might jump forward with a little bit, so I kind of prepare two topics, but I think we jump to the 2nd one, which is the diagnostics itself. So, um, if you can go forward until the... Yeah, at the greenish, uh, style, yes. Yes, yes, thank you.
Um...
So, yeah, just saying that this is, uh.. Analysis tool has been a big topic. So, at, uh, 2026 was a, uh, planetary session for the 3rd day, so we spent a lot of time talking about that. So, uh...
And I just present you here, the participation of the Drakkar group, why they want to go forward discussion about analysis too.
So, um, just saying that, that's something that was said today at the event, that's a topic where we analyze the same data, and we look at the same fields, but we kind of reinvent the will in many cases.
And often, it's one struggle point for the people that are starting, that it's, they start to use Nemo, and then, they have to use diagnostic tools, either, they have to build them, or they might struggle to find what's available.
So, that's why the, at the DRAKKAr meeting, with a discussion about having a consolidation about those tools and what can be done to, to improve that.
In the same, uh, in the same idea of what we just discussed about the code base of Nemo itself, is just to, uh, yes, improve our efficiency, to not have duplication, but to be aware of what other people are working on and how they do it. So, we can go from simple analysis to, like, just surface temperature, to very complex one, like, water mass analysis that, uh, seem to be, like, quite, uh, complicated, uh, to, uh, perform and to compute, so that that's, uh, that's one thing that, uh, we might, uh, help each other on that.
So, uh, yeah, if you can go forward, I just want to present what's currently available, so, uh...

Not everybody knows, but there's a lot of analysis to that are already implemented inside the Nemo code itself. So, uh, I just make a list, so if you look at the right location, those are just the list, the name of this, uh, of the sum module, but the, the 3rd one, that's the one that we at, uh, CCCma, we discover recently, it's, uh, you can have a mechanism in the model that work in line at every timestep that will calculate that transport to transact. There's some manipulation to do, but basically, you can see my transect start from this location to this location, and then put some manipulation, you can have the transport calculated at every time.

That was a recent discover. But just to say, that even if it's right under your nose, in the code, we often we don't see it right away, and we don't know what to work with that.
But, of course, there's other inline diagnostic. Like, like, uh, there's some title lettices. The 2nd one, the 31, the transport I just mentioned, there's each South volume budget. That's something that is very important for us, doing global skid simulation.
If we mess up the budget that happened in that bus.
We thought that the sea level was decreasing, but we figured out that was the, the runoff routhing, that was sealing the water at some point.
So as an example, that's very important for us. And other diagnostic that is more mechanical transport, which is how much mass and heat travel from the low to high latitude at the global scale.

Other tools exist as well on the offline walls. So, yeah, can go forward.
So, um, there's, like, three of the main, of course, there's many, uh, that exists, so that was just, uh, alighting the three, uh, principle that I saw people using a lot.

The CDFTools, that, uh, mini, mini teams in the Mercator group are using that is basically, uh, Fortran code that are compiled and useable with the common line, uh, come and line interface.
I don't, I didn't see anybody from our group using that, but there's like, all the way to calculate many things, like, uh, yeah, everything you can think, but it's all small, fortran code that can be compiled.

The 2nd one, it's in the same spirit. It's a Python library. So if you can go for work, Paul, we saw the low example, it's very interesting because it's very easy to install, you basically clone a repo when you do pip install, and you have access to plenty of a library full of way to calculate many elements. So if you coding in Python, you can just import the library and start using that. So I just want one app.I just want, I just have one example here of calculating the temperature inside the Labrador, the Labrador sea, but it was just one function that was applied to have that result.
And, of course, they have plenty of others, and because it's repository, that is on GitHub, it's public. You have access to the issue tracker, the discussion,

everything. So that's a very interesting point of that.

The other one is the one developed by Stephanie Taylor. Uh, just the next peaceful Paul. Yeah, it's a Nemo Scope. It's, uh, yeah, just lighting the work done by our colleague, uh, at, uh, to see the ocean, so, uh, Stephanie Taylor, present that, uh, it's in a similar way, it's a title library that you can clone and ensult. This one has a lot of emphasis with the comparison with different kind of measurements. So, uh, uh, STD station, buoy, sheep armbark, uh, measurement and all that. Yeah, big emphasis on that so you can, um, get the observation and many different aspects, but then compared to your model result very quickly.
And in a similar fashion, it's like I said, a Python library, you can clone, install, and then important use right away.

So that was the kind of what already exists. I know many people doing mini, uh, that kind of stuff, but if you can go forward, I just prepare some question that, uh, we might want to answer this session.

So, uh, yeah, what that, what diagnostic workslow tools are currently use across Canada? So I just, I like the one from DFO, but there's others.And all from MT is the ecosystem and all that, so, uh, there might be different programming language that we view, different kind of, um, install, uh, process. Is it possible and all those uh, and all those uh, challenges.
And in the existing Nemo, uh, consortium and community, what already exists, so, uh, and why they not use, uh, why they not more use, uh, in our team.
So maybe because they're not adapted, or maybe because we're not aware of the documentation, it's the present for their tools, or is it the case, and can that be improved maybe by a priority?

And another set of questions and the next slide. Just showing all the questions after that, we can have the discussion going in many directions. So, I was talking about, yeah, reproducibility and accessibility.
So that's a big, uh... We put a lot of emphasis, emphasis on that at CCCma. If your tool is only work on your machine, it's not a great tool, so it should be possible, and it can, the results should be representable in any machine that you shared, you work with.
And yeah, how much we duplicate our effort in that, and how much we can improve, to reuse, and maybe have new development, but in a smart and managed way where we feel there's a gap in our community.

The last set of questions is, yeah, it's talking about, yeah, the direction for the community. So what strategy we want to have, not only in Canada, but for the rest of the Nemo community?
Yes, we want to coronate maybe across Canada, but there's another stream of communication we can with the rest of the consumption, using existing tool can

share the work that we're doing and improve communication and uh, and improve the work that has been done in the community as a whole.

So, yeah, that's one kind of the three set of questions that I learned to launch the people here.
There's many challenge that are similar to the code beta, as well, because we're still talking about codes and programming language and how to import and install, so there's some similarity, but there's some specific challenge with the diagnostic. And, uh, yeah, for example, just remind me, I forgot, but there's an entire walking group atNemo, that's working, is really a way to improve and all that, so that's a big topic of interest for many institutes.

So I will leave it with the room. Again, you can just raise your hand, and we like to see your camera on, so, yeah, starting with Stephanie.

Stephanne: Uh, yeah, so, uh, thank you for your, uh, kind words, but, uh, the stuff I'm working on, um, I, uh, certainly am, uh, more than happy to, uh, share the code stuff that, uh, the tools that I've been working on. Um, although they are very much, uh, developed with the DB&M groups needs in mind. Um, so there is, uh, there's only one of me, I don't have time to be able to, like, make community-based tools.
But I think there are kind of multiple needs. So things like the NEMO scope cookbook, which is very accessible and does, is focussed on a lot of, um, larger scale, uh, considerations, really fills the gap.
We needed some tools to be able to deal with things in the near shore that care about, you know, when the water depth changes and things like that, when you're just dealing in very different contents, which is, in our group deals, because we're at the child resolution. It's kind of unusual for a lot of Nemo users.
Um, and for the diagnostics working group, I attended the 1st meeting, um, I intend to participate to some, in some capacity, going forward, because they'll have me, obviously. Um, but, um, there's certainly a lot of appetite for it.
Um, and I think, uh, if we're having this conversation about coordinating amongst yourselves nationally, then that makes it much easier too than coordinate with our international colleagues as well. So I think the fact that we're having these conversations, kind of, at the same time, is really good, so...

Nicolas: Yeah. Uh, I will try to share the.. The information with this diagnostic working group, so, uh, it's part of the mailing list of Nemo. Maybe not everybody got it, but maybe a little bit later, I will gather it and have information sent to where we want.
So, yeah, thank you, Stephanie.
So, other comments.
Going forward, yes, I see, Greg.

Greg: Yeah, I'm just looking at what you have here with the community toolbox direction.
I'm just wondering, I mean, coming back to what we were talking before about the code sharing whatnot.
I think, in general, as much as possible, if we had some central way to share things, I think that would be really a good facilitator for all sorts of different things, but, um, so if we had, you know, a GitHub page or something where, you know, it is, we're gonna have our all our codes and configuration files, namelist, then we could have, like, a sub project that has, you know, different sort of analysis things people have done. So, you know, I looked at, like, spiciness, density, water mass, diagnostic, important time. I could have, like, you know, put that up there with an example, and maybe linked to a publication, and then somebody else was interested would be able to pull that.
I mean, if we had that kind of a resource, um, I think that could be, you know, very helpful for sharing these things.

Nicolas: Yeah. Yeah, for sure. Uh, I see, Paul, you have your hand, physical, and, uh, is it intentional?

Paul: So, the problem is, when I'm sharing screen, I don't have a put up hand button.
I can't... As far as I could feel, that's why you might see weird things happen in the street. I was trying to find a, put a hand button, but I can't when I'm sharing the screening.
So just there's a couple of points. Yeah. Uh, for CDF tools. I use them. I've used them for 20 years, and I really like them. I think they could be used more. They're of great value.
But they're in coordination, you know, with the tools, I think it would be really useful. That's something, but it's not easy.
So I use Matlabs. Some of my students use matlabs. Some use Python.
I use MatLub because it's been around forever, and it's my era, so I've learned it, and then, you know, Python, but, you know, we reinvent the wheel far too much internally, never mind between groups. So I'd love to find a way, because especially for some of the complicated diagnostics. When you say, want to forget potential vorticity on an isopotential surface. You know, you don't want people to be reinventing that, you want to share, as well as even explaining how things work.

On the Nemo website, we've got a few things, like, for example, Xianmin did before, for, like, rotating velocities between nemo, tripolar, grid, and these acts, or calculating eddie kinetic energy. We actually have some simple PDF guides, but they're probably not that easily accessed. And I think, again, the whole community is people do this, I think, would be great.
The more we can do this better. And I think we do need to do it in Canada as well

as communicate with the international group.
The big problem with the international one. I saw that email about their session they were having on the diagnostics.
And it was 6 a.m. I've been to time and I was not even going to consider joining. Sorry, but yes.

Nicolas: Yeah, that's the shadown of that.
And just, yeah, before switching to, uh, to Stephanie, just a reflection that I had, uh, yeah, it's good to share the tool, and then to have a place to, uh, wear the code, and the largest share, but one difficult is, it's on the user's side. What I mean is, at some point, you have to use a tool that are online that might not be yours. So that might not be in the code that you used to, that might use the architecture or the style used to. So I think that's a challenge on the user's side, that we want to overcome and to say, yeah, it's not exactly in my flavour, but I want to use it anyway, because of the adventure. So that's one of the holding blocks that I saw a lot of time.
Uh, yeah, go ahead, Stephen, yeah.

Stepahnne: Uh, well, just to know, I am happy to be the token person on the East Coast with the most favourable time zones for meetings with Europeans, so that's, there'll be at least some Canadian representation.
Um, but, uh, what was I gonna say?
Oh, yes. Um, for coordinating, um, just, I would just want a flag that we do risk splitting discussions, right? So if we've got, we already have, especially within DFO and environment Canada, we have the science, the internal science GitLab, that's internal to government. It's not publicly accessible. That's typically where all the discussion about issues and things like that goes.
And then, if we have a public-facing one, which I don't get me wrong, we absolutely should. But, I think that we then also need to have a conversation about, do we just migrate to a fully public discussion system, where it's only have one repository, or is this, uh, do we risk basically losing the context of, uh, discussion about why decisions were made, but, uh, this kind of comes back to the, um, discussion about namelists, and how, you know, when you change one parameter in a namelist, then there's this whole discussion that, you if, if you just have the namlist, you take it out of context.
And so you can lose some information that way. Um, I don't know that there's an optimal solution to this. I just want to find that if we start having things in multiple places, then it can be almost harder to keep track of what's going on in all those different places, so...

Nicolas: Yeah, and we did experiment that in our team. We had a, like, part of our work on the public facing site, and most of our work on the internal, and that was very challenging. I get a little bit more about that, but I will let Greg go ahead, yeah.

Greg: Yeah, so, I mean, there's one sort of question I had, sort of, related, what Stephanie was saying, was just, if we do have different gitt, um, repos for things, you know, how we manage the history.
Um, I don't know, it's one of the big advantages of git is having that.
So when you do that, that's sort of one aspect, but so the point I wanted to make, because I was a little bit surprised that up to this point, and given what the second half of this meeting is gonna be, that there hasn't been any discussion of about the integration of all of this with machine learning tools, um, and what the impacts of our choices are, and in particular, in terms of being able to share all of these tools, being able to make them visible to agents, I think, is gonna become more and more important.
Um, and certainly, like, what you're saying, that if it's, you know, if it's not in the flavour, what you want to do, well, that's not a problem, because you can just, you know, have an agent sort that out for you. So, um, you know, I think there's many more people turning to coding vibe machine learning.
And so, uh, you know, I think a big piece of that is making things accessible and transparent, and so certainly anything that moves in that direction, I think, is going right.

Nicolas: Yeah, thank you, good. Very interesting angles for this...
How much we just read out to, it's so much different with AI, so that's affect everything on that.

I will just say a little bit more on what Stephanie said with the public and internal strategy, just to say that we settle on the strategy that our discussion are internal, but daily, we have a crown job that will push the history in our public faces.
So the public gitlab at all the history and all the emergent information, but just our issue tracker is internally.
And there's a public issue tracker as well, that some people, time to time in our external cababorator, they interact with, so if they have a question there, we will definitely answer, but that's the strategy, we have to not split our effort to have just a crown job pushing the history from internal to the public.
Uh, yeah, Amber.

Amber: Yeah, I think, you know, all good points. The GitHub offers, like, a GitHub organization that's free for universities.
So potentially the Nemo, the Canadian Nemo group, could set up an organization for us that would be, like, this central location. Not to say they have to be in charge of, you know, managing it. Um, but they, they could potentially set that up for free for us.
And then, I guess, I wonder, like, given what you said, Nicola, about how, you know, it is possible to manage two different repos, um, I guess I wonder, do we need to? Like, do we need the internal reboat, separate from the public facing one?

Is it necessary to keep things, like, and then how, and then if that's the case, then, because it seems like you're just automatically, like, the crown job is just sending everything out. So, I guess I'm just a little bit confused about why you need two separate ones, if then you're just gonna have everything go out to the public one anyway.

Nicolas: Yeah. I think it's mostly for security reason.
So, uh, to not manage too much, what can be public and what cannot be public, we, like, start with internal discussion, and then push on the public face, what to be comfortable pushing.
For example, there's a model version that we have internally, that is not on the public face because of many considerations, that's a little bit the strategy, but like I said, at some point, we have some of our projects, we're 100% on the public side, and it was just difficult because it was 2 different GitLab, that was the most difficult part.
But up there, the discussion, we were having, like, issue tracker, and we seen all that, it was fortunately well, but it was just a connection that was hard to figure out.

Amber: Yeah, 'cause I wonder if, you know, I don't think we necessarily need everything that's on this internal get, um, that we're developing, to be pushed publicly. I think, you know, it's probably more a place for that polished work. So you have, like, you did all these tests, and you made a nice little report internally. Well, that's the thing you want to share publicly and so that somebody can go and look, oh, here's all the nice results and the code they use and everything.
I don't necessarily have time, or, like, for most people, you're probably not gonna look through all the details of development through it anyway, right?

Nicolas: Yeah... Yeah, and it's the kind of thing where the, the decision is difficult, but when the decision is done, what to share, it's very easy, like technologically to share that.
Um...
To, yeah, see, Paula, girl, with your head, yeah.

Paul: I wanted... Yep, and I know you are...
In terms of analysis, there's two additional things, you know, we, you know, one is also, one of the useful things, I think, a lot of groups are doing for analysis, are Lagrangian and Tracers, are Lagrangian and particles and that. And there's a multiplicity of tools that people can use from Marianne, open to parcels, open drift, et cetera, et cetera. And again, can we coordinate some of that and learn from different groups?

The other thing about analysis is, especially if you're evaluating models, is you need to evaluate against observations. And getting data, getting data into a useful

format, getting the observationalists who understand the data, to process it in a way that we can then look at it properly in terms of scales and other things with the ocean models is a huge task. And it's really in a totally separate bin than, you know, writing, sharing our analysis scripts. But I think we need to think about how we are getting, feeding in what we need to evaluate our models at different scales, different locations, what level of metadata, sections, processed data, are being used. And I think that's going to link to all the evaluations we are doing.
I think maybe that's where we can, we, you know, we've got in the Nemo community practice we should be linking more with CIOOS. Yeah, and our other groups are associated with DFO.

And as an example, I was chatting with some colleagues in DFO yesterday, they wanted, data, and they weren't talking about, they wanted to look at Mooring data in parts of the Eastern Arctic, and they didn't even know what, necessarily, no, they're about data that other groups had collected, so even the data people among themselves, but definitely then getting it to us modellers, I think is a big question.

Stephanne: Yeah, could I just jump in here? Because I've spent a lot of time working with this, and it is an unbelievably vast amount of work that needs, that is needs to be done on that, and it's, it's not spatially uniform. There's some regions in Canada that are much more organized. And there's some where data is all over the place, and difficult to find, and not in standardized formats, or they're in their own state. It is.. It's a lot of work.
And, yes, I have, if anybody wants to, is going on that track of things, by all means, please get in touch. I'm happy to, you know, I've done a bunch of work to try and, um, is the neum scope tool basically requires a standard format. It's not necessarily, it's not the same format as anybody else, but, like, because it pulls from a whole range of different sources, and everybody's got their own formats. Um, and CIOOS is great. There's tons of stuff that doesn't get into disease, because the data managers don't have capacity, it's not in the same, like, it doesn't fit in quite well, like, whoever's data, it is, doesn't have time to put it in. The, like, go through the standardization process.
It's, uh, do not underestimate how much of how the headache that is if you are embarking on that. I just want to throw that out there.

Nicolas: Yeah, thank you, Stephanie, we feel for you. So, uh, yeah, and let's go forward with Greg.

Greg: Good, a different point it's gonna raise, but maybe just in response to Stephanie's first.
Um, just want to note that, um, so we're working on a global ocean reanalysis, and then eventually, hopefully, regional ones.
And as part of that, we needed all of our observations and kind of our standard

forms, so to see level of symmetry, as well as all the in situ stuff. And so that kicked off a little bit, the discussion with the SeaDoo folks, to put as much of the Canadian Institute data into the format that goes into Noobs, which is how we calculate the model observation differences. And so it's just, like, I see a, um, uh, an NetCDF flavour, but, uh, they re reprocessed the, uh, Casts data set, uh, that Frontier developed.
So for the Canadian East Coast, and then they're working through water properties now, and then after that, hopefully the North. So it was a way to pull together all of the kind of regional Canadian data into a common format.
So I imagine it's a small task for an agent to sort out the difference in formats between that and whatever Nemo scope needs, but that might be, at least part of the solution. I know you do more than just institute profiles, but...

Stephanne: Casts the water properties are not the problem here. It's all the other stuff.

Greg: And then, anyway, the other point I was gonna make was about, um, uh, the need for kind of reliable, uh, data. So, there was a couple weeks ago in April, Montreal, there was an ocean predict science team meeting, and then a task team and artificial intelligence task team workshop. And then just after that, then there was a Copernicus meeting that I was participated in. And in all of this, one of the things that came back is, as we're sort of transitioning to more and more machine learning emulators and different applications, then the kind of standard diagnostics that often we've been doing, you know, calculating RMS against observations and things can be often misleading, um, because of the way the emulators are trained. And so having, you know, different ways of looking at things that can help to provide information about the reliability and the physics contained in things is very important.
And so diagnostics, it's kind of, I speak to that. In particular, that include some scale awareness, I think, are very important.
And coming back to this idea of the GitHub and sharing of tools. I mean, when we do that, if we could also share kind of benchmarks, so that we know that using this tool, this data set gives us this number, I think it very useful in terms of showing that things are robust, 'cause I think we risk moving quickly into a world where we have a massive diversity of poor quality machine learning tools, that it can become very difficult to know, it may run, it may give you an answer.
This my sort of criticism of Python. I'm more of a fortran kind of guy. And um, but it may not be the right answer, right?
So I think having benchmarks and these sorts of tools to make sure that we're doing things correctly, and that we're building on a solid foundation, I think, is gonna become increasingly important, as well.

Nicolas: Yeah, thank you, Greg.
So, um...I don't see any other hands. So there's, uh, I think about 15... Oh, boy.

Yeah, sorry.
I just had a little, uh, offline, so, uh, yeah, I see the, uh, head of intern, so, yeah, you can go ahead and, uh...

Hatem: Yes, uh, concerning the, uh, information, uh.. Uh, related to the open drift and the lagrangian works, we are, uh, the uh, Canadian Coast Guard, the technical team, working with the Spill view, process, and actually, we will now reach the level that we're using all the Canadian port model. So, we're covering all the domains in Canada, and definitely, we're interested into what, getting more reliable, and good feedbacks from NEMO, the Canadian ocean models, using the new, as part of their simulations. So, we are using all of them, basically, 200 to 500, Vancouver Harbour, 20 metres, all of all the models, and we're using them forcing the, uh, if there is any incidents on the water, Canadian order, and so we're looking forward having good results and collaboration on that purpose, thank you.

Nicolas: Yeah, thank you. So, uh, yeah, I see there's about 15 or 10 minutes left. I don't know, Paul, if you want to switch topic, uh, add one or two prepare, if you, uh, we find it, someone else, uh...
Yeah?

Paul: I'm fine, if you want to go over here, just these other slides.
Yeah. And then we can just try to wrap up the big picture of all the discussions, or not wrap up, at least bring together some of the ideas we've had, 'cause we'll touch on them again at the end of the session, I think, on Wednesday.

Nicholas: Okay. Yeah, so, um...
The other aspect that it's related to what we first talk at the beginning, like talking more about the code base of Nemo, and how we can collaborate, to have some shared understanding of what has been done in Nemo.
So I was looking at something similar. It's the, I call it the adjacent models, a library, so it's, yeah, element that are either inside, uh, Nemo or are kind of adjacent, that can be added, uh, can be different models.
So, the SI3 model.The SI cube is the one in Nemo, but we heard from some people that using CICE, so out, it can related to the work that we're doing in Canada. So we collaborate and coordinate on that.
Similarly with the BGC models. We have different BGC model. That's the topic of discussion this afternoon, if I'm not mistaken, but just saying that the fact that we're having different BGC model, all the integrate inside Nemo, and how it can be used and shared in a similar way, that's something we can coordinate, and the other two, it's XIOS, the IO server, that I think most of the people that use Nemo 4 and above are using, and Oasis, which is the coupler.
So in both cases, Yes, that's what's available in Nemo and the Nemo ecosystem, let's say, but that's what we can decide to do and how we can collaborate and have different chores that what has been available.

So, uh, if you can go forward twice, oh, yeah, just saying that, I would just want to show the IPSL model. It's using all of this altogether. So, what's above, it's that atmospheric model, we know less a little bit about that, but everything that is below, we kind of understand what it means. So they have the coupler and theXiOS and all the difference system, but you see all the all tied together with a complexity of coordination that can happen on the computer side, but us.
I mean, we...
Like, for example, in our team, we use only a different couple, but it's not interacting well with the XiOS server, so that's some challenge there, but just to understand, what is being done right now in different team across Canada, and how much we should, and how much we.. Should not, maybe, in some cases, collaborate and have a common tools with those adjacent models.

That was mostly the open question that I had with this topic. Like I said, it's related with the Nemo code, but not always, because it's a little bit on the periphery.

But I was interested to hear about how people, they managed that I'll manage a model, that are adjacent, and what development they have been doing in that, and how it integrates well, or not well, in the current Nemo, uh, code base. So, uh, yeah, that's the topic I had.
So I don't know if people have, uh, comment of what they're doing or what their challenge are or what their strategy should be, in our in our group.

Yeah, I see Jim. Raising his hand, so yeah, go ahead.Uh, you, you tell Jim, as long as you try to see something.

Jim: Okay, okay, sorry about that. It wouldn't let me unmute until I did something else irrelevant.

Yeah, sorry, I was, I, I, I had to drop off at 10 o'clock for another meeting, and then I just came back in about two minutes ago.
But I think this... What I just wanted to mention here is, I think, it's important for the broader community to understand what we did in CCCma, um, with the latest iteration of the biochemistry models, right?
So, I mean, the history here is, we started with Nemo 3.4 and then we embedded CMOC and Canoe into Nemo 3.4.
And then later on, canoe into Nemo 36, and that was Amber mostly did that. And then Nicola was primarily responsible, and also with some contribution to ampers, well, archiving that as Nemo 36MC, right?
So, for my DFO, CSRF project, I used that code base, then NEMO 36 MC, with canoe. But all of those models, basically, were built around a framework of, you know, PISCES, we basically just hollowed out PISCES, and inserted our own process parameterizations. And that turned out to be a kind of short-sighted, not

very good way of doing things.
So in the next iteration of CanESM with Nemo 4, we basically set it up so that CMOC and canoe would be parallel to PISCES, on the assumption that every new version is gonna have PISCES, and so we don't want to delete that, we don't want to use it, but we don't, you know, it has to be there. It has to be part of the code base, it's gonna be compiled, it just won't be used. So we've rewritten, you know, rewritten around a code structure where, we don't use PISCES, but we don't tamper with it either.
And I think it's just important for the broad community to understand that the strategy that we used the first time was not a very smart or sustainable one. So the idea was, you know, now we only have to do this once.
Now we can transition from Nemo 4 to Nemo 5, and we're not gonna have to completely rewrite the biogiochemistry code each time.

Nicolas: Yeah, and, uh... There were a little bit more work. Yeah, no, I know the work that Jim and his team did, so they were a little bit more work done with the interface with the current existing code base and our new BGC model.
And I see some similarity with the sea ice.

So uh, Of course, SIcube, it's like you're right, we need to use it Nemo, but I know I've been in my Canada, so people are using CICE, which require kind of the same interface with the existing Nemo code. And from what I understand, there have been some challenge there where, um, yes, CICE can be its own model, but all it connect with the current code. It's not our way obvious, and um, there's been some work done on that, but I don't know if people from Aligama Canada want to comment on that experience of having a different sea ice model but still using Nemo.

Yeah, see, Greg?
Yeah, I can go ahead.

Greg: Uh, I'll, I'll look, friend. I was waiting for Fred to respond. His hands.
Go ahead

Nicolas: Yeah, go ahead.

Fred: I was trying to find the right button. Sorry guys.
Yeah, yeah, the experience was, uh, was indeed a bit difficult at the start. It was a big, we managed something in the end where we wasn't, it wasn't very efficient because we still had to, uh, to reshare, but yeah, the haloes, uh, the MPI haloes after each exchange between CICE and Nemo. But then we, uh, we figured out later how to exchange directly in the, well, how to configure CICE and emos about the exchange target on the same time. So there's no more halo issues there.
And we're still remaining, uh, the big remaining issue is that we can't use AGRIF.

Uh, because we are outside of a framework, uh, used by nemo. So that's the biggest limitation really.
Uh, except for that, I mean, CICE is a pretty neat model in general, there's a lot of physics, uh, tuning, you can do, uh, um, well, a lot of physics, physical processes are represented that are, not necessarily in SI cube.
So we are, probably in the, Yeah, we're working on that to, to make uh, to make uh, SI3, um, on par with uh, CICE.
But anyway, the, is, I'm not sure always the, well, if I, does that answer the question you had or,

Nicholas: Yeah, yeah, I just want to understand uh, the challenge that happened, but, uh, so your, the future strategy is it still to keep CICE, to keep using that and work with the consortiuum, to integrate that better, or it's to, maybe, do the opposite, to use SI cube and to integrate the physical process in that model?

Fred: Yeah, move a second. Yeah. I mean, it's a bit heartbreaking, but the problem is, we can't really, uh, resources to work on two consumptions, so... So, I think the decision was to concentrate on Nemo and let go of CICE at some point.
So we'll see the main thing that in operations for a while. Yeah, we will switch over at some point.

Nicolas: Yeah. Yeah, and for us, just staying a similar challenge that we're having is the coupler, so the thing right in the middle always is. So, like I said, we're not using OASIS, we're doing something else, that has been developed many years ago. And the same, we work a lot to have the interface work with our coupler and the ocean.
It's working well, but it might be the future possibility. Like, for example, we have a problem now that it's not scaling that well, our couple. We're using higher resolution model, in the ocean, yes, but in the atmospheric model, as well, so it needs to be very efficient, with storing, struggling with that.

And just saying that there's been some machine learning experiment, then, in the Nemo consortium, that's used, Oasis, the coupler, as the communication point, between some machine learning model, and Nemo.
The example, we saw it's the bolk formula. So a topic that was touched this morning, the bulk formula, it was a machine learning system that was dedicated to have that. But to communicate with Nemo, it was really passing to Oasis as a communication point, so that was very interesting, but as the future of development that we might miss using our current coupler. But, of course, there's many, many more challenges related to that, in our team, but it's just an interesting topic that we can bring in time to time.

And I see Neil, I don't know if it's in that specific example, but yeah, go ahead.

Niel: Yeah, so a couple of things on that. I mean, I think, um, you know, there's been work done both in, um, you know, meteorological research division or whatever the names of them are now. Um, on couplers. And I think that is an area that we've previously identified, we could, um, collaborate on more, and I think that would be something in the future.
I mean, on Oasis in particular, I believe it might have been Geoff, who told me that the lead Oasis developer is retiring, other groups are thinking of going away from Oasis and using XIOS. So again, you know, it's like, just pulling in different directions, right? Oh, we're not using oasis, so we're going to miss out on this AI integration. Oh, well, an Oasis is gonna be, um, you know, made redundant anyway, apparently, according to some people. So it's, it's quite hard to navigate this space.
We have to kind of be quite thoughtful about what are we actually trying to achieve and that kind of thing.

Nicolas: Yeah, yeah, thank you that I didn't think about all. There's a great benefit of using the community tool, but there's a challenge, a dependency that we start using those tools, we kind of depend on the developing cycle that might not be ours.
So, yeah, that's a good challenge. With that as well.

And on the left side here, the side, I have other example of maybe other adjacent models that are not exactly inside Nemo, but are often attached, either, like, at one time, when their model is running, or it's a component that is essential to feed Nemo in some aspects. So I just, this, like, four that I was aware, like, the interactive wave model that you can work coupling with the ocean cycling model, the river rotting model, that's a little bit what we discussed with the Natasha in our team. That's, uh, something that is will feed the runoff of the ocean, uh, from the land, from the water coming from the land model, so that's kind of a connecting piece. There's a tide and storm, some surge model as well.I know there's people on the floor on the storm source side that are working to understand that a little bit more, and there's a... ice sheet dynamic models.
So, for example, us working on the global scale, you won't understand a lot more what's happening around Antarctica, but it's a little bit the same with Greenland, what's happening with the ice sheet over there, was the interaction with the warming of the atmospheric condition, how it can affect the ocean, and how it can interact.
So that's another model that we've been working with, but it's not exactly... It's not our expert, even in what not pretending to working on that, but this aspect that we want to integrate in some way, in our global model.

Um, yeah, maybe if other people have comments, we can have a last turn of interversion, if someone have information to say.

Yes, Geoff? Go ahead.

Geoff: This is a moment. I'll save people sometime. You highlighted that DCT module for computing transects, and, um, yeah, we just played around with it, like, very recently, and found that it's very, very slow, and this is probably something that's just better done offline. So, hopefully, that might save something the time.

Nicolas: Okay, yes, the cute, just, uh, the lesson learned.
Yes, Greg?

Greg: I was wondering, I mean, you mentioned the challenges, um, with your coupler at, uh, CCCMA.I mean, traditionally we do gossip here. We have discussions in the past about, you know, different approaches and advantages, disadvantages. I mean, but more recently, we've been developing this Iris coupler. Have there been any, has it been communicated to folks CCCMA? Are you aware of this? Is there any interest in.. Collaborating on that, or getting involved, or is it not? Yeah I'm sure in the short term, anyway? It would really solve your problems, but maybe longer term is a way that it could be made too.

Nicolas: Yeah. So, yeah, if I'm not mistaken, maybe they'll have more to say about that.
So there's been some discussion, and we are aware of the development done, on Iris side, but I don't think we fully integrate the development that has been done then, and the functionality that we can use, that we have our own, like I said, developing cycle in our own work currently, but for sure, that's one aspect that we could look a little bit more to have a better collaboration on that. And I heard that you've been working on the IO server as well. So that's another aspect that we can collaborate because just to sit with the IO server, when we work with higher resolution model, just outputting result can slow down the actual wrong time of the model. IO server that's fully functional that's very useful, so...

Yes.

Neil: I think, you know, we met a few years ago, Greg, and spoke about couplers, and at that point, Iris was a kind of concept in development, and then just, maybe a month ago or something, I went to the gem, uh, kind of extended steering company meeting, and people were like, this is going into IC 5, and I was like, oh, wow, okay, so it was completed.
So I think we, yes, definitely. I think there's an opportunity there. And I think we do slightly different things in our coupos, but I think that's okay.
I think that, you know, there's some kind of basic infrastructure that could be shared, especially with our gym, with interface, with the coupler, and then with Nemo, and then where certain calculations have to happen that we have that you might not have, that can be figured out. But yeah, I think is a good opportunity

there for sure.

Nicolas: Um, yes, so I see that the time is moving forward. So, um, yeah, I don't know, Paul, you have a last word to say about this session and maybe what's coming up during the day.

Paul: So, I guess the last word.I think we had a good discussion.
It's really, you know, um, number of people have commented on different thoughts, coordination, sharing, trying to find ways to make from code to forcing files to diagnostic tools, GitHubs, more available, more integrated, I, you know, you know, I think we've all sort of known that, but in fact, we'll keep discussing it, we'll hopefully drive things towards getting things set up and moving in the right direction.
So I think, um, that's great.
I think, uh, it's gonna lead into, again, coordination discussions, we continue on with this workshop, um, so, yeah, I'm not gonna repeat the specifics, but I, you know, I think there's things there that we can continue, uh, to move forward with that I think will be useful, uh, for the rest of today in the discussions, for next. I'm going to pass that over to Inge.
I think there's going to be a short health break before we go to the second session.

Inge: Yes.
So, right now, it will be about a 15 minute coffee, walk, toilet, whatever break, um, and then we will come back at 10 minutes past the next hour for wherever you are for us.
It 10 minutes past 12. Um, and then we'll be back.
Um, we'll leave the zoom on and then um, uh, if you want to carry on chatting during the break, please feel free. Um, but uh, um, yeah. Great.